ATTACHMENT B

Claims 1-25 (canceled)

26. (new) An ion conducting composite membrane material consisting of a polymeric matrix filled with particles of cation conducting zirconium phosphate.

27. (new) An ion conducting composite membrane material according to claim 26 wherein the polymeric matrix is filled with particles of proton conducting zirconium phosphate.

28. (new) An ion conducting composite membrane material according to claim 26 wherein the polymeric matrix is filled with particles of cation conducting modified zirconium phosphate.

29. (new) The membrane material according to claim 26 wherein the zirconium phosphate is a zirconium phosphate of the general formula $Zr(O_3POH)_{2-X}(O_3P\text{-}Ar)_X$, where Ar is a sulfoarylen group and $0 \leq x$.

30. (new) The membrane material according to claim 26 wherein the zirconium phosphate is a-zirconium phosphate $Zr(O_3POH)_2$.

31. (new) The membrane material according to claim 28 wherein the modified zirconium phosphate is a zirconium phosphate sulfoarylenphosphonate $Zr(O_3POH)_{2-X}(O_3P\text{-}Ar)_X$ wherein Ar is a sulfoarylen group and $0<x\leq 2$.

32. (new) The membrane material according to claim 26 wherein the conductivity of the membrane material containing optionally modified zirconium phosphate is $>5x10^{-4}$ S cm^{-1} at temperatures of 0 °C to 200 °C and a relative humidity of 100%.

33. (new) The membrane material according to claim 26 wherein the conductivity of the membrane containing optionally modified zirconium phosphate is $>10^{-2}$ S cm^{-1} at 70 °C and 95 % relative humidity.

34. (new) The membrane material according to claim 26 wherein the polymeric matrix of the membrane material is that of an ionomer.

35. (new) The membrane material according to claim 26 wherein the polymeric matrix of the membrane material is that of a proton conducting ionomer.

36. (new) The membrane material according to claim 26 wherein the polymeric matrix of the membrane material is at least one synthetic ionomer of the group consisting of perfluorosulfonic polymers, sulfonated polyvinylidenfluoride, sulfonated polyetherketones, sulfonated polybenzimidazoles, sulfonated polyphenylsulfones, sulfonated polysulfones and sulfonated polyethersulfones.

37. (new) The membrane material according to claim 31 wherein the zirconium phosphate sulfoarylenphosphonate contains at least one phosphonate group bonded to the zirconium atom.

38. (new) The membrane material according to claim 31 wherein the sulfoarylenphosphonate group is meta-sulfophenylenphosphonate.

39. (new) The membrane material according to claim 26 wherein optionally modified zirconium phosphate is of layered type.

40. (new) The membrane material according to claim 26 wherein the amount of optionally modified zirconium phosphate in the membrane material is 0,5 % - 70 % by weight.

41. (new) A method for the preparation of the proton conducting composite membrane material according to claim 26 based on the following steps:

a) preparation of a layered optionally modified zirconium phosphate,

b) preparation of a colloidal dispersion of the optionally modified zirconium phosphate in a suitable solvent or mixture of solvents,

c) transfer of the optionally modified zirconium phosphate particles from the said colloidal dispersion to a solution of a polymer,

d) forming membrane materials by using the mixture and eliminating the solvent.

42. (new) The method for the preparation of the proton conducting composite membrane material according to claim 41 wherein the polymer is a ionomer.

43. (new) The method for the preparation of the proton conducting composite membrane material according to claim 41 wherein the polymer is a ionomer of the membrane material is that of a proton conducting ionomer.

44. (new) The method for the preparation of the proton conducting composite membrane material according to claim 41 is at least one synthetic ionomer of the group consisting of perfluorosulfonic polymers, sulfonated polyvinyliden-fluoride, sulfonated polyetherketones, sulfonated polybenzimidazoles, sulfonated polyphenylsulfones, sulfonated polysulfones and sulfonated polyethersulfones.

45. (new) A method for the preparation of a proton conducting composite membrane material according to claim 26 consisting of a synthetic ionomer with lamellar particles of α-zirconium phosphate based on the following steps:

a) exfoliation of a-zirconium phosphate in aqueous solution by intercalation - deintercalation of an alkyl amine,

b) dispersion of a-zirconium phosphate, obtained from the previous intercalation deintercalation process, into an organic solvent,

c) transfer of the exfoliated zirconium phosphate particles from the said colloidal dispersion to a solution of a polymer,

d) forming membrane materials by using the mixture and eliminating the solvent.

46. (new) The method for the preparation of the proton conducting composite membrane materials according to claim 16 wherein the mixture containing the polymer and the optionally modified α-zirconium phosphate is obtained by

mixing the ionomer solution with the colloidal dispersion of the layered α-zirconium phosphate or zirconium phosphate sulfoarylenphosphonate.

47. (new) The method for the preparation of the proton conducting composite membrane materials according to claim 45 wherein the mixture containing the polymer and the optionally modified α-zirconium phosphate is obtained by mixing the ionomer solution with the colloidal dispersion of the layered α-zirconium phosphate or zirconium phosphate sulfoarylenphosphonate.

48. (new) The method for the preparation of the proton conducting composite membrane material according to claim 41 wherein the colloidal dispersion of the optionally modified α-zirconium phosphate is obtained by using at least one organic solvent selected from the group consisting of N, N'-dimethylformamide, N-methyl-2-pyrrolidone, dimethylsulfoxide, acetonitrile and alkanols, preferably N, N'-dimethylformamide and/or N-methyl-2-pyrrolidone, or their mixtures or water or mixtures of water and organic solvent.

49. (new) The method for the preparation of the proton conducting composite membrane material according to claim 41 wherein a ionomer solution and the colloidal dispersion are prepared in the same solvent or in different solvents, provided that the mixing of the solution with the dispersion does not cause colloid flocculation or ionomer precipitation.

50. (new) The method for the preparation of the proton conducting composite membrane material according to claim 45 wherein a ionomer solution and the colloidal dispersion are prepared in the same solvent or in different solvents, provided that the mixing of the solution with the dispersion does not cause colloid flocculation or ionomer precipitation.

51. (new) The method for the preparation of the proton conducting composite membrane material according to claim 41 wherein the mixture containing an ionomer and the layered α-zirconium phosphate or zirconium phosphate sulfoarylenphosphonate is obtained by "phase transfer".

52. (new) The method for the preparation of the proton conducting composite membrane material according to claim 45 wherein the mixture containing an ionomer and the layered α-zirconium phosphate or zirconium phosphate sulfoarylenphosphonate is obtained by "phase transfer".

53. (new) The method for the preparation of the proton conducting composite membrane materials according to claim 41 wherein the solvent is removed from the polymer-colloid mixture by evaporation.

54. (new) The method for the preparation of the proton conducting composite membrane materials according to claim 45 wherein the solvent is removed from the polymer-colloid mixture by evaporation.

55. (new) The method for the preparation of the proton conducting composite membrane material according to claim 41 wherein the solvent is removed from the polymer-colloid mixture by the use of a non-solvent, preferably water.

56. (new) The method for the preparation of the proton conducting composite membrane material according to claim 45 wherein the solvent is removed from the polymer-colloid mixture by the use of a non-solvent, preferably water.

57. (new) Composite membrane material of claim 26 in the form of an ionomeric membrane material with at least one of high mechanical properties and decreasing methanol permeability.

58. (new) Composite membrane material of claim 26 in the form of an ionomeric membrane material with high overall performance in hydrogen, in indirect and in direct methanol fuel cells.

59. (new) Composite membrane material containing α-zirconium phosphate according to claim 26 in the form of an ionomeric membrane material with high overall performance in hydrogen and in indirect methanol fuel cells.

60. (new) Composite membrane material containing α-zirconium phosphate according to claim 26 in the form of an ionomeric membrane material with high overall performance in hydrogen and in indirect methanol fuel cells operating at temperatures <80°C.

61. Direct methanol fuel cell containing a composite membrane material according to claim 26.